

### Accessing the Data Visualization Tool:

- Go to the My NASA Data website: <https://mynasadata.larc.nasa.gov/>.
- Move your cursor over to 'Visualize Data' in the menu at the top of the page until a list of options appears. Click on 'Earth System Data Explorer (LAS)' in the options that appear.



- Once you click 'Visualize Data', the main page of the Earth System Data Explorer will appear. If another window appears asking to 'Please choose a data set.', click OK to access the visualization tool. The **main screen** of the Earth System Data Explorer will appear after clicking OK.

**Main screen of the Earth System Data Explorer:** Below is a roadmap to the main screen of the Earth System Data Explorer. Each of these important components will be useful when creating a map. When each part of the main screen is referenced in the instructions below, an icon with the corresponding color and number will be included for reference (Example: when **section 8** of the main screen is referenced, the icon ⑧ will appear).

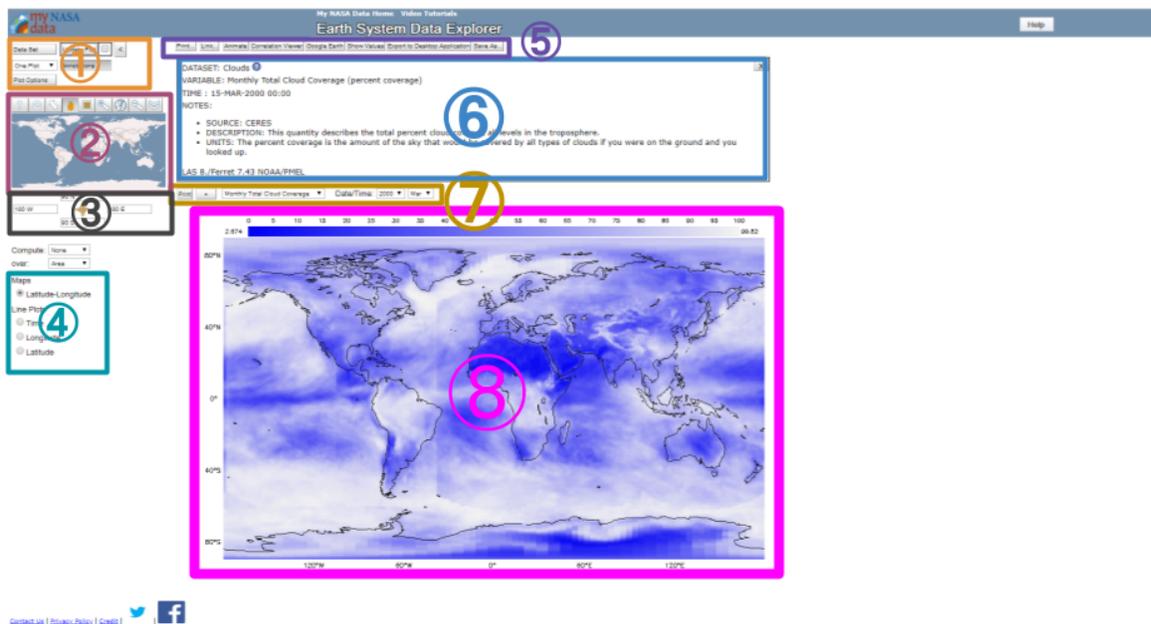


Figure 1. The main screen of the Earth System Data Explorer. The labeling marks the most important parts of the main screen for the purposes of this lesson.

### Creating a map:

The benefit of the Earth System Data Explorer is that NASA data has already been cataloged and formatted, so that maps of the data can be easily plotted.

See the detailed instructions below to create a map.

#### 1. Load the data.

- A. Click on the 'Data Set' button in the top left corner of the main page (in **section ①**). After clicking the 'Data Set' button, a menu should appear. Each of the categories in this menu are the different spheres of the Earth System.

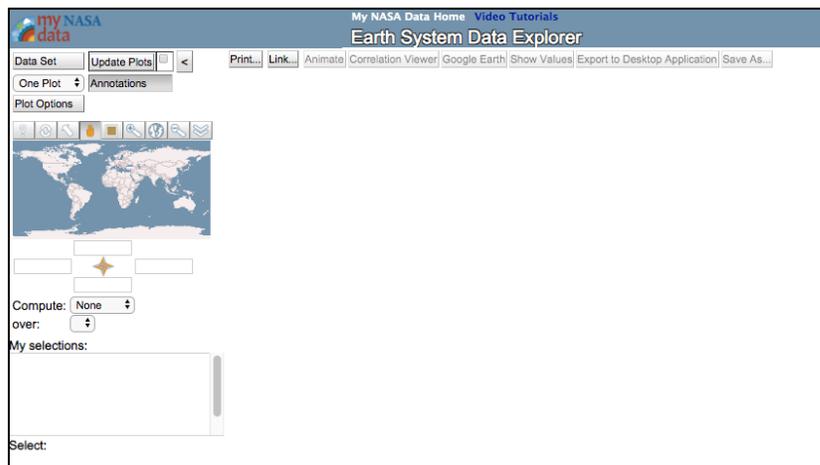


Figure 2. The menu that appears after clicking the 'Data Set' button. This menu is where all of the data sets available on the Earth System Data Explorer are located.



**Good to Know:** The Earth System Data Explorer has data from five different Earth spheres: the Atmosphere, Biosphere, Cryosphere, Geosphere, and Hydrosphere.

- B. Click on the plus-sign icon (+) next to the sphere from which you want to get your data. Another list should appear after clicking the plus-sign icon.
- C. A list with two entries should appear: *All Data* and *Featured Phenomena*. If you are looking for a particular phenomenon that is featured on the My NASA Data website, click 'Featured Phenomena' and a list should appear. Otherwise, click 'All Data' to see all of the data choices available for that sphere.
- D. A list of data categories should now appear. Click the plus-sign icon again to see the list of data sets available in the category.



Figure 3. The expanded menu of choices for all available data sets in the 'Atmosphere' -> 'Clouds' -> 'Cloud Cover' categories.



**Good to Know:** Make it a habit to check back with the Earth System Data Explorer and the My NASA Data website. We are always updating datasets, adding new data, and adding lessons that support new Earth System phenomena.

After doing this, you should now have a list of data sets in the menu (Figure 3) that can be plotted.

### **2. Create the Map.**

Click on the data set you would like to use. After a few seconds, a map with your selected data plotted should appear in **section 8** on the main screen.

#### **Features of the map plot:**

- Info box (**section 6** in the main screen): This area contains the name of the data set and notes about the data. Notes (also seen as 'Annotations') describe the source of the data set, a description of what the data describe, and a description of the units.
- Name of data set and Date/Time options (**section 7** in main screen): This is the name of the data set from the menu. The date and time that you want to plot can be chosen in drop-down menus here. The entire time range that is covered by the data set and available is shown here. Note: If the data has no time component, then the date dropdowns do not appear.



**Good to know:** You can select any other datasets listed in the subcategory in the drop-down menu with the name of the dataset. Make sure to click 'Update Plot' (in **section 1** in the main screen) if you make any changes here.

- Colorbar and Map (**section 8** in the main screen): The colorbar for the map shows the relationship between the data and colors in the map. The numbers next to the end of the colorbar show the maximum and minimum of the data in the current map view.

### Customizing the Map (sections ①②③ in the main screen)

To choose the **area** that the map covers, use the mini-map in **section ②** in the main screen.

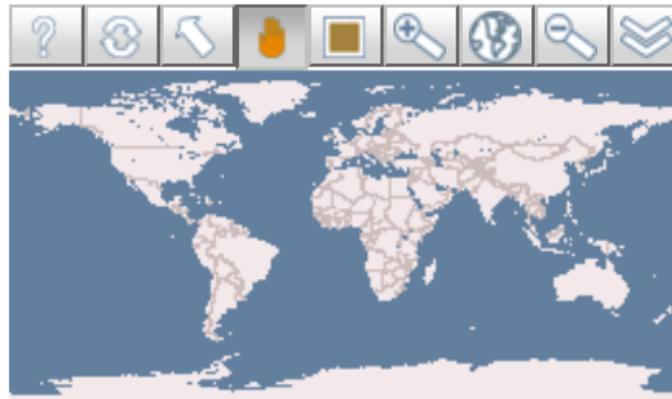


Figure 4. The mini-map found in **section ②** of the main screen.

The mini-map shows the current extent of the data shown. If we want to change the extent of the data map, there are several tools in the small toolbar above the mini-map that will accomplish this. For all tools, the button will be depressed when the tool is selected. The area that will be shown in the new map will be highlighted by an orange box.

#### Tool Bar:

	<b>Box tool</b> : Select this tool to highlight an area in the mini-map over which you would like to plot your map.
	<b>Plus-sign magnifying glass</b> : Zoom in the mini-map.
	<b>Globe</b> : Return view to global view
	<b>Minus-sign magnifying glass</b> : Zoom out mini-map.
	<b>Double downward arrow</b> : Opens menu where you can choose predefined areas and automatically zoom your map to these areas.
	<b>Double circular arrows</b> : Reset view to original default extent.

Remember: Once you are satisfied with the area chosen, select the 'Update Plot' button (in **section ①** of the main screen).

To choose the **latitude and longitude boundaries** of map plotted, use the features in **section ③** of the main screen.

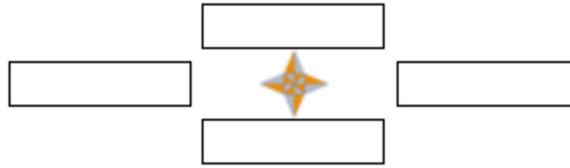


Figure 5. The longitude and latitude boundaries (**section ③**) found below the mini-map of the main screen.

If a specific longitude and latitude range is desired, the range can be input in the four boxes below the mini-map. Latitudes are input in degrees North (example: 20.3 N) or degrees South (example: 31.2 S), and the values are put in the top and bottom boxes. Longitudes are input in degrees West (example: 123 W) or degrees East (example 17.6 E), and the values are put in the left and right boxes.



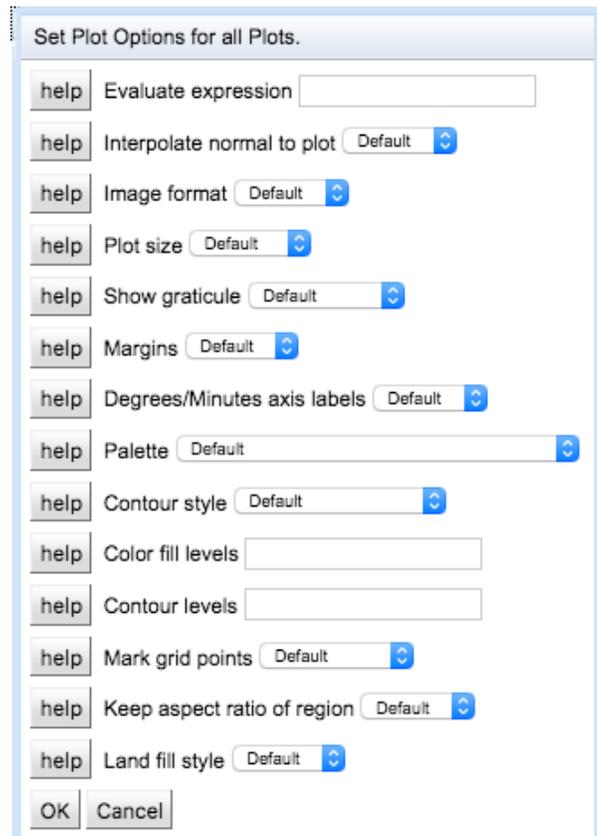
**Good to Know:** When you select one of the predefined areas using the double-arrow tool, select your own area using the rectangle tool, the latitude and longitude bounds automatically update with the bounds of your selection.

To change the **colorbar**, select the 'Plot Options' button in **section ①** of the main screen. Selecting this will open a window with several plot options. The two most commonly used options are the 'Palette' and 'Color Fill Levels' options.

Figure 6. The Plot Options menu that appears when clicking the 'Plot Options' button. After making any changes, click the 'Update Plot' button in **section ①** of the main screen to apply the changes to the map or plot.

The dropdown menu next to the 'Palette' option contains many color maps that can be applied to the data map.

The 'Color Fill Levels' option sets the minimum, maximum, and the spacing within the color map. Each data set has default color levels to best fit a global view of the data. To set your own color bar range, type in (MIN,MAX,STEP) next to the option, with MIN a number for the minimum level desired, MAX a number for the maximum level desired, and STEP the desired color map spacing.



After making any changes to plots, click the 'Update Plot' button in [section ①](#) to update the map or plot.

### 3. Print the plot and download the data

#### Printing

Once you are satisfied with the plot displayed and you want to print it, select the 'Print' button in [section ⑤](#) or [⑦](#) (both buttons work). Once pressed, a separate tab will appear in your browser with the info box and the plot.

A pop-up should then appear to save the image as a .PNG file. To download to your computer, right click the image and select 'Save Image As...'. The .PNG file, once downloaded onto your computer, can then be printed.



**Good to Know:** Make sure to use the 'Print' button to save your image. If you right click the map in the main map view and select 'Save Image As...', the map will not save correctly.

#### Downloading

For either line plots or maps, the data can be downloaded as a comma-separated values file (CSV file). This type of file can easily be exported into Microsoft Excel or GIS platforms.

To download a CSV file containing the data in the map or plot, select 'Save As' in the top toolbar ([section ⑤](#) in the main screen). A new tab will appear in your internet browser.

In this new window, select 'CSV' from the drop-down menu labeled 'Select a Data Format'. You can also select a range of dates by selecting the start and end date below (This range is not required to match the start and end date of the main plot or map. You can download more data than what is plotted).

Specify your data's requirements and then click "Save" to download.

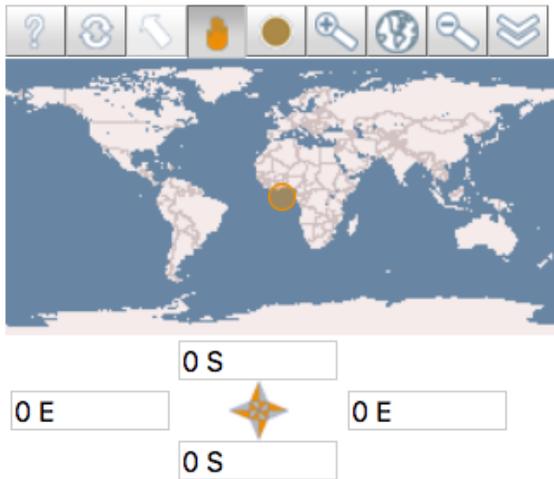
Selected Region:  
Longitude range: [-180, 180]  
Latitude range: [-90, 90]  
Select a Data Format:  
  
Select Time:  
Start date/time: 2006 Jun  
End date/time: 2006 Jun

*Figure 7. The options that will appear in a new tab or window once the 'Save As' button is selected.*

Once you are satisfied with the selections made, click 'Save.' A file will then appear that can be directly downloaded to your computer, or the data will appear directly in your browser. If the data appears directly in your browser, click 'Save As' in this window to download the data to your computer.

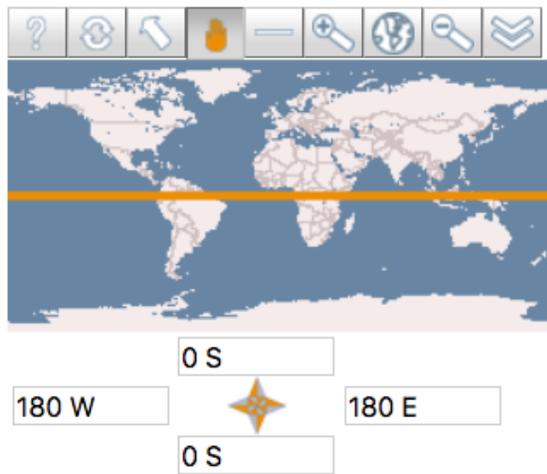
### Line Plots

To create a line plot: At the bottom of the left-hand side of the main screen (in [section 4](#)), there are button options to choose the type of plot. Selecting any of the bottom three options results in a line plot.



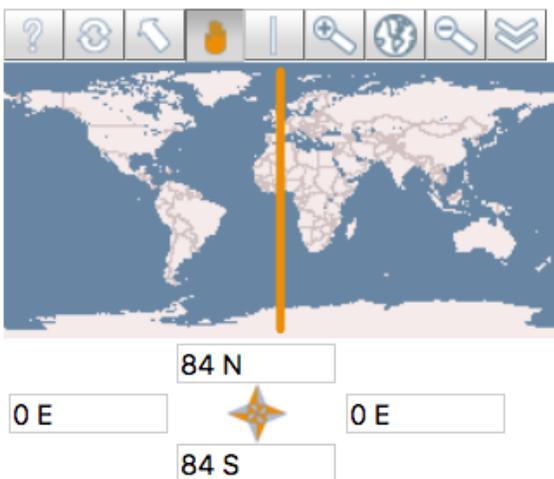
**Time:** This option creates a time series plot at any location on the mini-map above. The location can be chosen by entering the latitude and longitude coordinates below the mini-map, or by using the circle tool  in the toolbar above the mini-map. The time range that the plot covers is also shown below the latitude and longitude coordinates.

*Figure 8. The mini-map and options that appear when creating a line plot.*



**Longitude:** This option creates a plot of values across all longitudes at a chosen latitude line. The latitude line can be chosen in the mini-map using the line tool , or chosen by directly entering the latitude and longitude coordinates below the mini-map.

*Figure 9. The mini-map and options that appear when creating a longitude plot.*



**Latitude:** This plot is similar to the **Longitude** plot, but the values plotted are across all latitudes at a chosen longitude line.

Identical to the maps, a text box exists above the plot in [section 6](#) with information about the plot and the data once the line plot is created.

*Figure 10. The mini-map and options that appear when creating a latitude plot.*



**Good to Know:** Like the maps, the appearance of the line plots can be customized by selecting the 'Plot Options' button above the mini-map.



**Good to Know:** Like the maps, line plots can be downloaded and printed using the 'Print' button. See the 'Downloading and Printing' part of the Map section for instructions on how to download and print.

### Creating Animations

1. Load the data set you would like to animate (see Step 1 of [Creating the Map](#)).



**Good to Know:** You will not need to define the dates for your animation until later on in the tutorial.

2. In [section 5](#), select the “Animate” button.
3. A “Set options for Animation” window will appear. Similar to Plot Options, the “Set options for Animation” window may be used to adjust the color bar, add contours, etc.

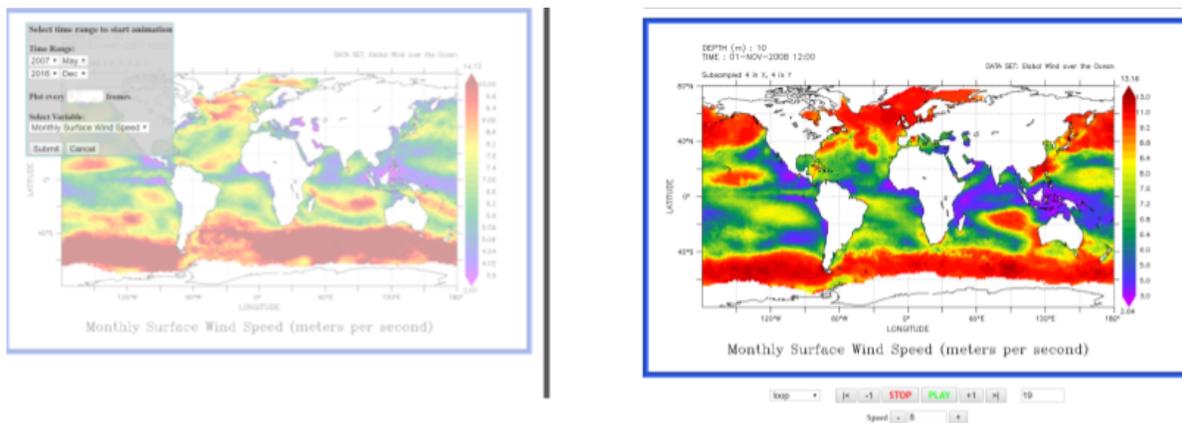


Figure 11. a) The date and frame options that appear after selecting the “OK” button in the “Set options for Animation” window (Step 4). b) The animation panel after the animation loads (Step 6).

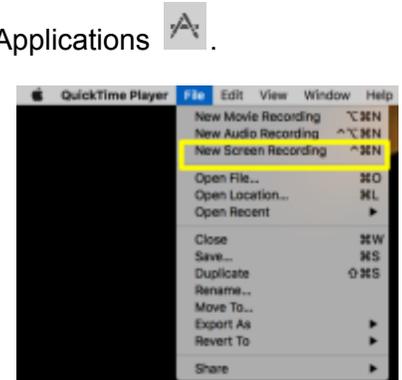
4. At the bottom of the “Set options for Animation” window select the “OK” button.
5. A new tab on your browser will appear, titled “LAS Animation” (Figure 11a). Under the “Time Range” header, select your start and end dates for the animation. Additionally, you have the option to plot only select frames within your time range. For instance, if you would only like your animation to display every other month you would choose “Plot every 2 frames” for monthly data sets. If you only wanted your animation show one month out of every year you would choose “Plot every 12 frames”.
6. When you have entered your animation settings, select “Submit”. Your animation will take a moment to load. When finished loading, it will automatically play quickly on a loop.
7. At the bottom of the screen you will see animation settings (Figure 11b). Press the “Stop” button to stop the animation. Because the animation is running so quickly, you may want to adjust the speed. Change the speed to 1 and select the “Play” button.

### Saving/Exporting Animations

#### (Mac Version)

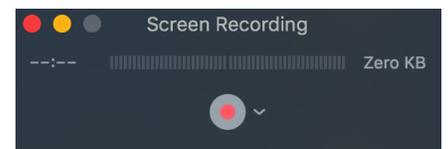
1. Develop your animation using the steps above in the “Creating Animations” section of this tutorial. Leave it running on the screen.
2. Now open Quicktime Player  (Note: Most every Mac computer will have this software).
  - a. If you cannot find this, visit the Finder  menu and find Applications . Navigate through the menu and open the QuickTime Player app.
3. Once  opens, go to “File” on top left hand corner and click “New Screen Recording.”

Figure 12. The Mac Window showing the “New Screen Recording” feature in QuickTime.



4. Now, you should see a small window open on your screen with a record option.

Figure 13. The “Screen Recording” window in QuickTime.



5. With your animation clearly running on the computer screen, click the red “Record” button in the “Screen Recording” window.
  - a. NOTE: You can record only the part of the screen that shows the running animation, rather than the full desktop. To do this, hold your mouse down and drag from one corner to another of the animation box. That should darken the rest of your screen except the highlighted part. Identify the button that says “Start Recording.”
  - b. Select “Start Recording” to capture and save the animation.
  - c. To stop the animation from being recorded, select “esc” at the top left hand side of the keyboard. The “record menu” should reappear then select the “Stop Recording” button  and your recorded video should appear for playback.
  - d. File “Save”. Export As: (Name your file).mov and “Save.”

### Saving/Exporting Animations

#### (PC Version)

1. Develop your animation using the steps above in the “Creating Animations” section of this tutorial. Leave it running on the screen.
2. Now open Microsoft PowerPoint  (Note: Screen recording capabilities are only present in PowerPoint versions 2013 and later.)
  - a. If you cannot find this, click on the Windows key  and scroll down through your applications to find Powerpoint. (Your applications will be listed in alphabetical order)
3. Once PowerPoint  opens, click on the “Insert” tab.
4. Select Screen Recording in the right hand corner.



5. On the Control Dock, click “Select Area”.



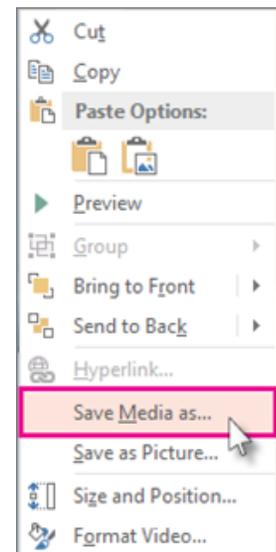
Figure 14. The Control Dock Window, with the Select Area button outlined.



Figure 15. The Control Dock Window, with the “Stop” button outlined

6. Navigate to your animation on the Earth System Data Explorer
7. Using the cross haired cursor , click and drag from the top left-hand corner of the animation to select it as your recording area.
  - a. If you do not like the recording area you selected, you may click the “Select Area” button again to reselect an area.
8. Click “Record” to begin recording
9. Click “Stop” to end your recording

Figure 16. The location of the “Save Media as...”



10. To save the recording as a file on your computer, right click the picture of the recording in powerpoint and select “Save Media as...”
11. In the “Save Media as...” box, choose your folder location and file name
12. Select “Save”